ReACT User Manual

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Related Documents

Document No.	Document Title	Issue
OM-20000129	OEM6 Family Firmware Reference Manual	Latest
OM-20000127	OEMStar Family Firmware Reference Manual	Latest

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1-00	First version	18/06/2012

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1 Notices

The following notices apply to the ReACT.

1.1 CE Notice

The ReACT GNSS system enclosures carry the CE mark in accordance with EN ISO/EC 17050-1 2004.

1.2 Environmental Standards

The ReACT GNSS system has been tested to the following standards:

Temperature Operating (procedure II)	MIL-STD 810F, method 502.4 -32°C MIL-STD 810F, method 501.4 +75°C
Temperature Storage (procedure I)	MIL-STD 810F, method 502.4 -40°C MIL-STD 810F, method 501.4 +85°C
Humidity	MIL-STD 810F, method 507.4, procedure 1, cycle 1
Water Immersion	MIL-STD 810F, method 512.4, IEC 60529 IPX7
Salt Fog	MIL-STD 810F, method 509.4 (48 hours)
Sand and Dust	MIL-STD 810F, method 510.4
Fluids Susceptibility	MIL-STD-810F, method 504 (24h, 50°C in hydraulic fluid C635, hydraulic fluid H540, fuel F-50, fuel F-54)
Vibration	MIL-STD 810F, method 514.5, category 20, MIL-STD 810E, method 514.4 tbl. 514.4-AXVII
Shock	MIL-STD 810F, method 516.5, procedure I, IV
Electrostatic Discharge (ESD)	IEC 61000-4-2 level 2 (± 4 KV)
Electromagnetic Compatibility (EMC)	MIL-STD-461F (Ground, Army), FCC Class A, European CE, 89/ EEC EN 55022 Class B, EN50082-1
Ultraviolet Light Protection	MIL-STD-810F, method 505.4

1.3 RoHS Notice

The ReACT is compliant with the European Union (EU) Restriction of Hazardous Substances (RoHS) Directive 2002/95/EC.

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2 Warranty Information

Forsberg Services Ltd Warranty Policy

Forsberg Services Ltd (FSL) warrants that the navigation products manufactured by FSL are free from defects in materials and workmanship, subject to the conditions set forth below, for the following periods of time:

ReACT - One (1) Year from the date of sale
Software Support - One (1) Year from the date of sale

Date of sale shall mean the date of the invoice to the original customer for the product. FSL's responsibility respecting this warranty is solely to product replacement or product repair at an authorized FSL location only.

The FSL warranty does not extend to the following:

I. Non-conformities, defects or errors in the products due to accident, abuse, misuse or negligent use of the products or use in other than a normal and customary manner, environmental conditions not conforming to FSL's specifications, or failure to follow prescribed installation, operating and maintenance procedures.
II. Defects, errors or non-conformities in the products due to modifications, alterations, additions or changes not made in accordance with FSL's specifications or authorised by FSL.
III. Normal wear and tear.
IV. Damage caused by force of nature or act of any third person.
V. Shipping damage; or
VI. Service or repair of product by the user without prior written consent from FSL. In addition, the foregoing warranties shall not apply to products designated by FSL as beta site test samples, experimental, developmental, preproduction, sample, incomplete or out of specification products or to be returned products if the original identification marks have been removed or altered.

The warranties and remedies are exclusive and all other warranties, expressed or implied, written or oral, including the implied warranties of merchantability or fitness for any particular purpose are excluded. FSL shall not be liable for any loss, damage, expense, or injury arising directly or indirectly out of the purchase, installation, operation, use of licensing or products or services. In no event shall FSL be liable for special, indirect, incidental or consequential damages of any kind or nature due to any cause.

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3 ReACT D5 Model - Functionality Notice

3.1 Important Functionality Note

The FSL ReACT D5 model utilizes an internal connection to the GNSS COM2 port. Therefore any commands sent through GPS COM1 or GPS COM3 that will affect the configuration could reduce functionality.

When connected to either GPS com port the following commands should be avoided.

UNLOGALL
If UNLOGALL is sent to a GPS com port it will stop the output of commands on all GPS com ports and all of the EDGE com ports.

UNLOG
If UNLOG is sent to GPS com port it will stop the output of the specific command on all GPS com ports and all of the EDGE com ports.

COM COM2
GPS COM2 has been specifically configured for communicating with the FS-D5 and changing the baud rate of GPS COM2 will disable communications between the micro and the GPS receiver and therefore the micro com ports will no longer function.

FRESET / RESET
These commands will reset the GPS receiver to its original state and will disable communications between the micro and the GPS receiver and therefore the micro com ports will no longer function. A power cycle will recover the unit and allow the FS-D5 to reconfigure the receiver.

3.2 Reconfiguring GPS com 2

Functionality can be retained using either of the methods outlined below.

Reconfigure GPS COM2
Connect to GPS COM1 through a PC running Hyperterminal or similar terminal software and send the following commands to the unit.

COM COM2 9600 8 n 1 n off on
INTERFACEMODE COM2 NOVATEL NOVATEL ON
SAVECONFIG

Power cycle
If SAVECONFIG has not been applied, remove power from the ReACT unit by removing the connector plug and ensure that the unit is off, then re-apply power. The unit will configure itself for full functionality.

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4 Firmware Support

EDGE-WARE firmware is designed for use with the ReACT system. The EDGE-WARE firmware may not be copied, sold or re-issued in any form without the prior written consent from Forsberg Services Limited. The software is authorised for use only by the original licensed owner of the software.

Forsberg Services Limited assumes no liability or warranty associated with its use.

In no event shall Forsberg Services Limited be liable for any indirect, special or consequential damages whether through tort, contract or otherwise. This warranty is expressly in lieu of all other warranties. Expressed or implied, including without limitation the implied warranties of merchantability or fitness for a particular purpose. The foregoing states the entire liability of Forsberg Services Limited with respect to the products herein.

In the event of the firmware being upgraded new firmware and appropriate instructions shall be distributed by Forsberg Services Ltd.

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5 Introduction

5.1 Scope

This manual provides the information required for installation and operation of the ReACT GNSS system. The ReACT can be fitted with multiple GNSS receiver options and therefore an accompanying manual will be provided for specific receiver operation.

5.2 ReACT Overview

The Forsberg Services Ltd (FSL) ReACT (Receiver Antenna Compact Technology) is a compact, rugged enclosure including a high quality GNSS receiver, antenna and optional DSP module. ReACT has been designed for compatibility with NovAtel's OEMStar, OEMV-1 and OEM615 GNSS receivers. This family of receivers offer a range of functionality that can be controlled through firmware upgrades. The antenna fitted inside the system will be tuned for use with GPS L1 (G), GPS L1 and GLONASS L1 (R) or GPS L1 + L2 (D). This option is controlled through hardware and is non-upgradeable in the field.

The unit is available in three model types:

5.3 ReACT D5

The D5 model is the enhanced model of the ReACT by combining a GNSS receiver and antenna with our FS-D5 processor module. This provides enhanced functionality and additional I/O through our range of EDGE-WARE products. A metal 19-pin Fischer connector is provided for access to I/O. FSL provide cable options with the system.

Connectivity	Strobes
• 1 × configurable RS232/422 serial port • 1 × RS232 serial port or USB (3 × virtual RS232 ports) • 3 × EDGE RS232 serial ports • 1 × EDGE CAN port	• PPS • Event-in • VARF

5.4 ReACT NS

The NS model combines a GNSS receiver and antenna into a single enclosure. This model provides direct comms to the GNSS receiver. A metal 19 pin Fischer connector is provided for access to I/O. FSL provide cable options with the system.

Connectivity	Strobes
• 1 × configurable RS232/422 serial port (Configured at factory) • 1 × RS232 serial port • 1 × RS232 or USB (3 × virtual RS232 ports) (Configured at factory)	• PPS • Event-in • VARF

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5.5 ReACT NSc

The NSc model provides the same functionality as the NS with a centre mount cable. A metal 19 pin Fischer connector is provided for access to I/O.

Connectivity	Strobes
• 1 × configurable RS232/422 serial port • 1 × RS232 or USB (3 × virtual RS232 ports)	• PPS • Event-in

5.6 EDGE-WARE

The ReACT D5 model is capable of running EDGE-WARE, a firmware product developed by FSL. This firmware provides additional functionality and I/O. More details of the EDGE-WARE functionality and modules are provided later in this document.

5.7 Included in the Kit

The ReACT system comes with:

1 x ReACT GNSS System
1 x USB drive with
1 x ReACT Manual
1 x NovAtel GNSS Firmware Manual

Due to the range of applications and bespoke requirements the ReACT D5 and NS do not come with an I/O cable. This may be ordered separately and can be provided as a terminated cable or to flying leads with either a straight or right angled Fischer connector..

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6 ReACT Installation and Set-up

6.1 Power

The ReACT GNSS system requires an input supply voltage between +9 VDC and +36 VDC.

6.2 ReACT D5

6.2.1 Mechanical Dimensions

Dimensions: 116 mm x 116 mm x 85 mm
Weight: ~ 600 g

6.2.2 Connectivity overview

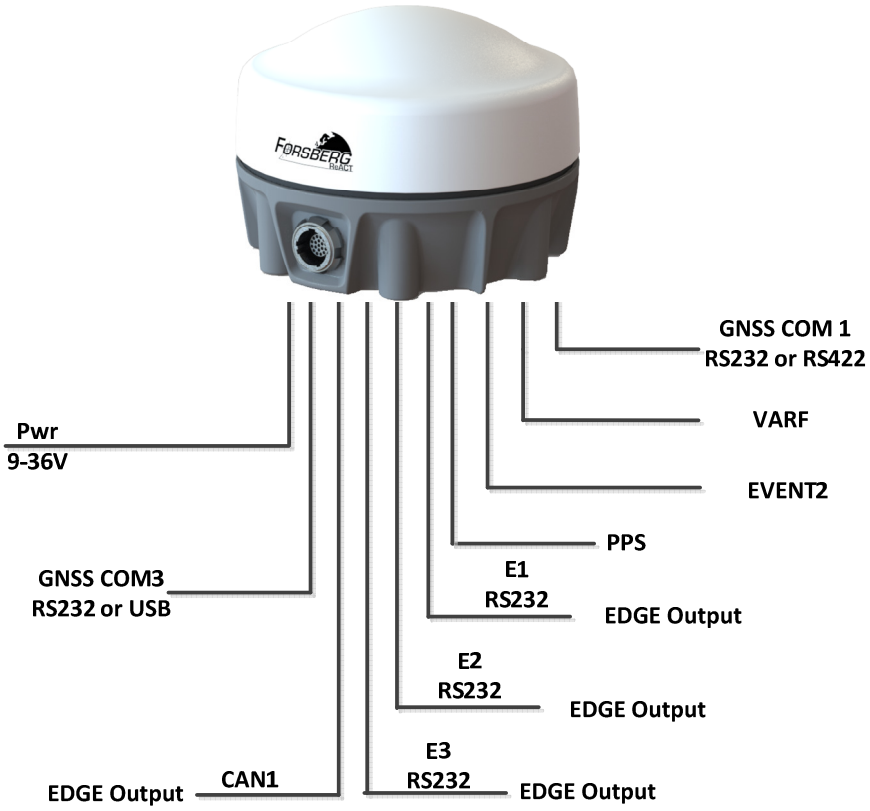

Figure 1 ReACT D5 Connectivity Overview

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6.2.3 Mounting Points

The ReACT D5 comes with two mechanical mounting options.

3 x M6 screw points for vehicle mounting

1 x 5/8” thread for centre/ pole mounting

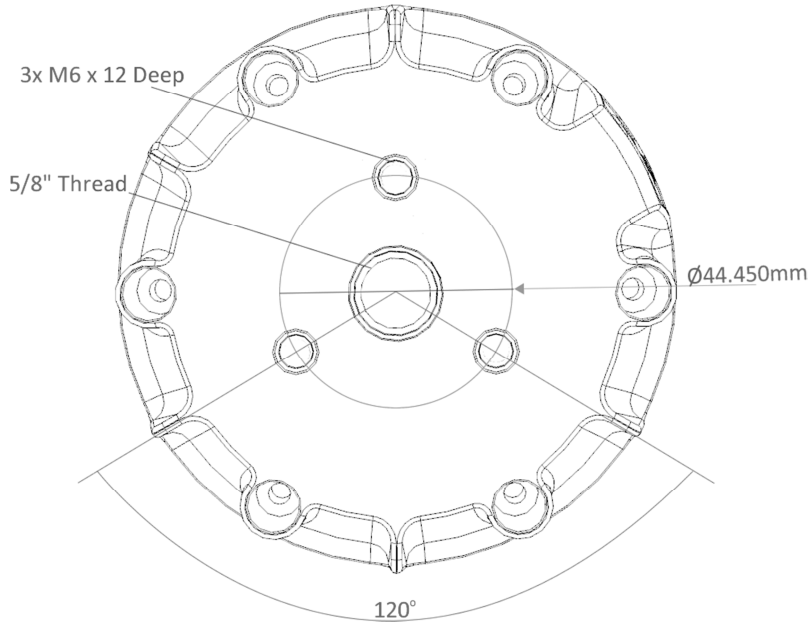

Figure 2 Mounting options for ReACT D5

6.2.4 Connector and Pinout

Description		Fischer Part Number
UltiMate, 19-Way Panel Mounted Socket		UR02W11 F019P BK1 E1AA
Pin	**Signal**	**Description**
1	COM3 TXD / USB_D-	GNSS COM3 or USB
2	COM3 RXD / USB_D+	
3	EDGE CAN High	EDGE-WARE CAN port
4	EDGE CAN Low	
5	E3 TXD	EDGE COM3
6	E3 RXD	
7	E2 TXD	EDGE COM2
8	E2 RXD	
9	E1 TXD	EDGE COM1
10	E1 RXD	
11	GNSS PPS	GNSS PPS strobe
12	GNSS EVENT2	GNSS Event In strobe
13	GNSS VARF	GNSS Variable frequency strobe
14	COM1 TXD / TX+	GNSS COM1 (RS232 or RS422)
15	COM1 TX-	
16	COM1 RXD / RX+	
17	COM1 RX-	
18	Power Return	Power
19	9-36V Power Input	
Shield.		Signal Ground

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6.2.5 Terminated I/O Cable

6.2.5.1 ReACT D5 232 Cable

Label	Description
A	Free Plug, Fischer UP01L11
B	Free plug, 9-way D-type male moulded connector
C	Free plug, 9-way D-type female moulded connector
D	Un-terminated wires
E	Cable, 20-way, shielded, 4.5m total length
F	Cable, 5-way, shielded, 0.5m total length

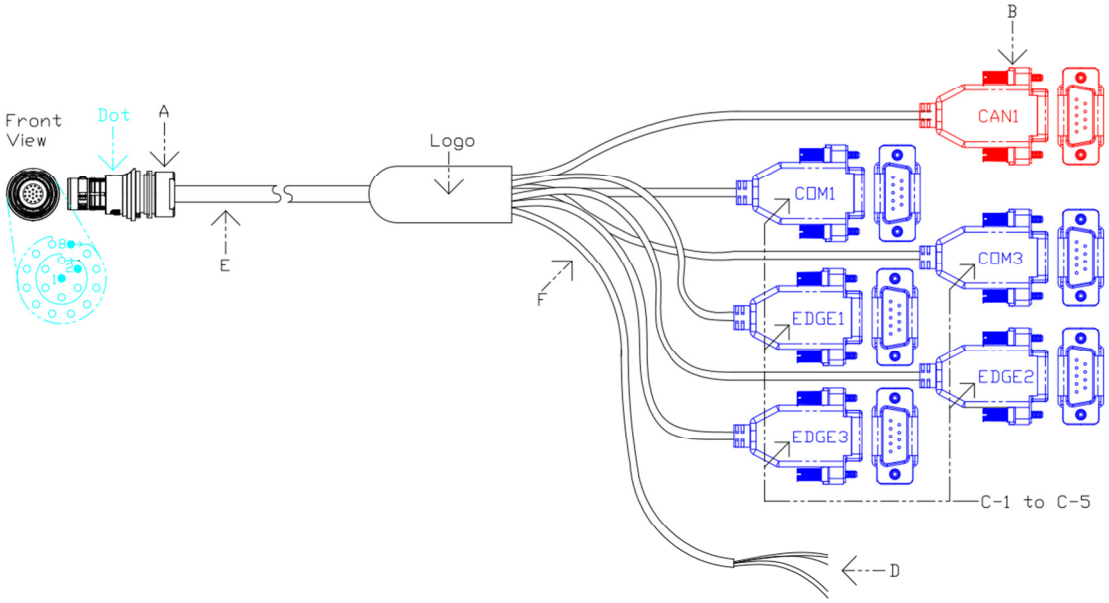

Figure 3 ReACT D5 232 Cable assembly

Description			Fischer Part Number	
UltiMate, 19-Way Plug			UP01L11 M019S BK1 Z1ZA	
Pin	**Signal**	**Description**	**Terminated to**	**Flying Lead colours**
1	COM3 TXD / USB_D-	GNSS COM3 RS 232 Or GNSS USB	Connector C-2 Pin 2	White
2	COM3 RXD / USB_D+		Connector C-2 Pin 3	Green
3	GNSS CAN High	EDGE-WARE CAN port	Connector B Pin 7	Green / Red
4	GNSS CAN Low		Connector B Pin 2	Red / Black
5	EDGE3 TXD	EDGE COM3	Connector C-5 Pin 2	Yellow / Blue
6	EDGE3 RXD		Connector C-5 Pin 3	Yellow / Red
7	EDGE2 TXD	EDGE COM2	Connector C-4 Pin 2	White / Blue
8	EDGE2 RXD		Connector C-4 Pin 3	White / Red
9	EDGE1 TXD	EDGE COM1	Connector C-3 Pin 2	Red / Blue
10	EDGE1 RXD		Connector C-3 Pin 3	Red / Brown
11	GNSS PPS	GNSS PPS strobe	(D) un-terminated	Orange
12	GNSS EVENT2	GNSS Event In strobe	(D) un-terminated	Pink
13	GNSS VARF	GNSS Variable frequency strobe	(D) un-terminated	Turquoise
14	COM1 TXD / TX+	GNSS COM1 (RS232 or RS422)	Connector C-1 Pin 2	Blue
15	COM1 TX-		Connector C-1 Pin 8	Violet
16	COM1 RXD / RX+		Connector C-1 Pin 3	Yellow
17	COM1 RX-		Connector C-1 Pin 7	Grey
18	DC Power Return	Power	(D) un-terminated	Black
19	9-36VDC Power Input		(D) un-terminated	Red
Shield. Signal Ground			Connector B Pin 3 Connector C-1 Pin 5 Connector C-2 Pin 5 Connector C-3 Pin 5 Connector C-4 Pin 5 Connector C-5 Pin 5 (D) un-terminated	Black (Link to Shield)

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6.3 ReACT NS

6.3.1 Mechanical Dimensions

Dimensions: 116 mm x 116 mm x 85 mm
Weight: ~ 600 g

6.3.2 Connectivity Overview

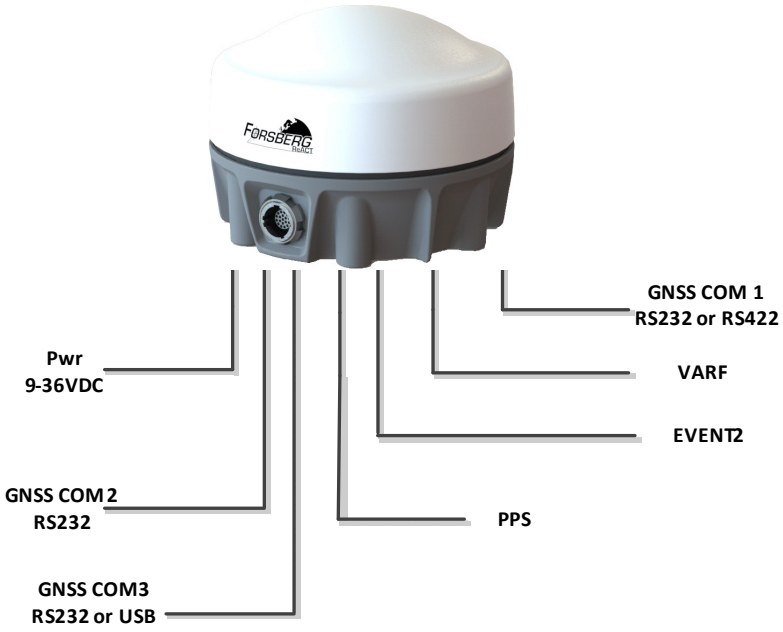

Figure 4 ReACT NS Connectivity Overview

6.3.3 Mounting Points

The ReACT NS comes with two mechanical mounting options.

3 x M6 screw points for vehicle mounting
1 x 5/8” thread for centre/ pole mounting

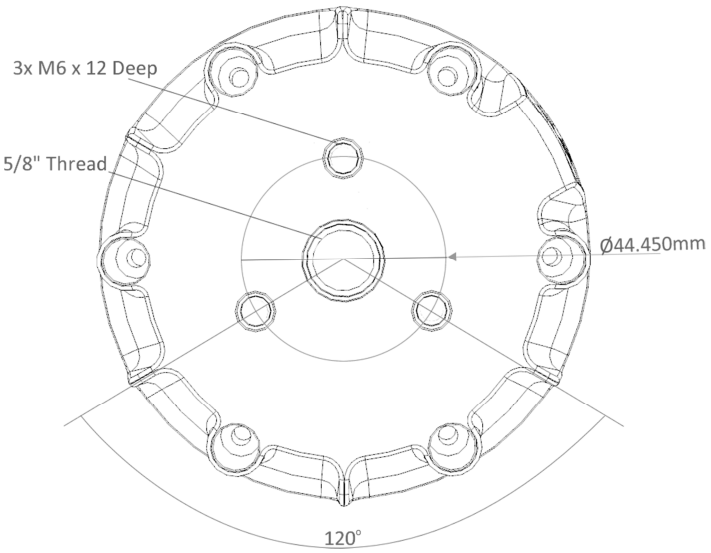

Figure 5 Mounting options for ReACT NS

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6.3.4 Connector and Pinout

Description		Fischer Part Number
UltiMate, 19Way Panel Mounted Socket		UR02W11 F019P BK1 E1AA
Pin	**Signal**	**Description**
1	COM3 TXD / USB_D-	GNSS COM3 or USB
2	COM3 RXD / USB_D+	
3	GNSS CAN High	EDGE-WARE CAN port
4	GNSS CAN Low	
5	COM2 TXD	GNSS COM2
6	COM2 RXD	
7	CONFIG TXD*	Factory use only
8	CONFIG RXD*	
9	NC	Reserved/ Not Connected
10	NC	
11	GNSS PPS	GNSS PPS strobe
12	GNSS EVENT2	GNSS Event In strobe
13	GNSS VARF	GNSS Variable frequency strobe
14	COM1 TXD / TX+	GNSS COM1 (RS232 or RS422)
15	COM1 TX-	
16	COM1 RXD / RX+	
17	COM1 RX-	
18	Power Return	Power
19	9-36VDC Power Input	
Shield.		Signal Ground

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6.3.5 I/O Cables

6.3.5.1 ReACT NS 232 Cable

Label	Description
A	Free Plug, Fischer UP01L11
B	Free plug, 9-way D-type Male moulded connector
C	Free plug, 9-way D-type Female moulded connector
D	Un-terminated wires
E	Cable, 20-way, shielded, 4.5m total length
F	Cable, 5-way, shielded, 0.5m total length

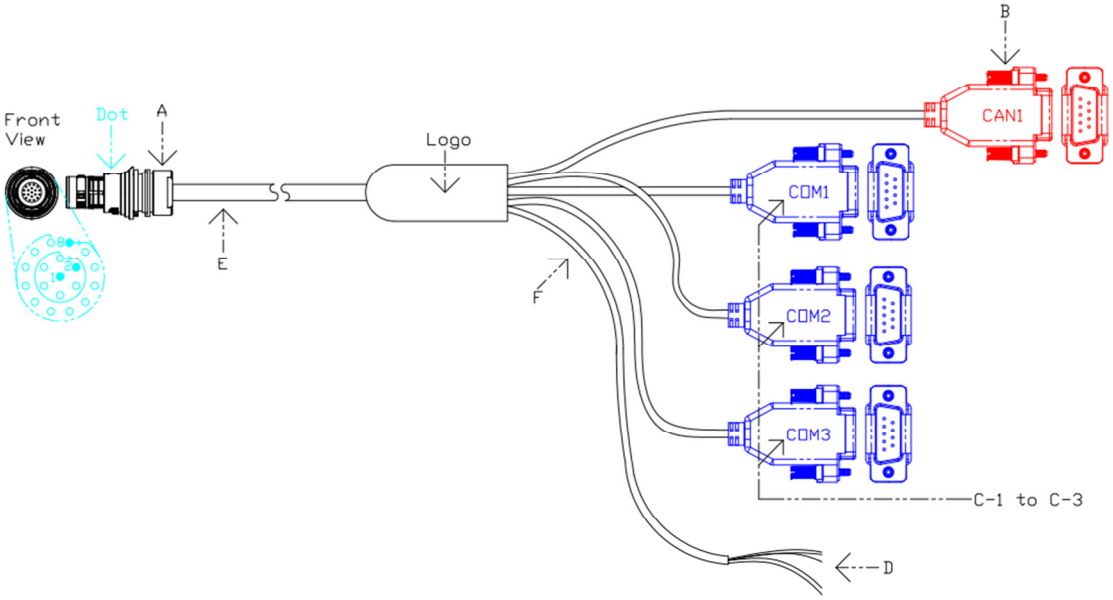

Figure 6 ReACT NS 232 Cable assembly

Description			Fischer Part Number	
UltiMate, 19-Way Plug			UP01L11 M019S BK1 Z1ZA	
Pin	**Signal**	**Description**	**Terminated to**	**Flying Lead colours**
1	COM3 TXD / USB_D-	GNSS COM3 RS 232 Or GNSS USB	Connector C-3 Pin 2	White
2	COM3 RXD / USB_D+		Connector C-3 Pin 3	Green
3	GNSS CAN High	GNSS CAN port	Connector B Pin 7	Green / Red
4	GNSS CAN Low		Connector B Pin 2	Red / Black
5	COM2 TXD	GNSS COM2	Connector C-2 Pin 2	Yellow / Blue
6	COM2 RXD		Connector C-2 Pin 3	Yellow / Red
7	CONFIG TXD*	Factory use only	N/A	N/A
8	CONFIG RXD*		N/A	N/A
9	NC	Reserved/ Not Connected	NC	NC
10	NC		NC	NC
11	GNSS PPS	GNSS PPS strobe	(D) un-terminated	Orange
12	GNSS EVENT2	GNSS Event In strobe	(D) un-terminated	Pink
13	GNSS VARF	GNSS Variable frequency strobe	(D) un-terminated	Turquoise
14	COM1 TXD / TX+	GNSS COM1 (RS232 or RS422)	Connector C-1 Pin 2	Blue
15	COM1 TX-		Connector C-1 Pin 8	Violet
16	COM1 RXD / RX+		Connector C-1 Pin 3	Yellow
17	COM1 RX-		Connector C-1 Pin 7	Grey
18	Power Return	Power	(D) un-terminated	Black
19	9-36V Power Input		(D) un-terminated	Red
Shield. Signal Ground			Connector B Pin 3 Connector C-1 Pin 5	Black (Link to Shield)

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6.4 ReACT NSc

6.4.1 Mechanical Dimensions

Dimensions: 116 mm x 116 mm x 79 mm
Weight: ~ 600 g

6.4.2 Connectivity Overview

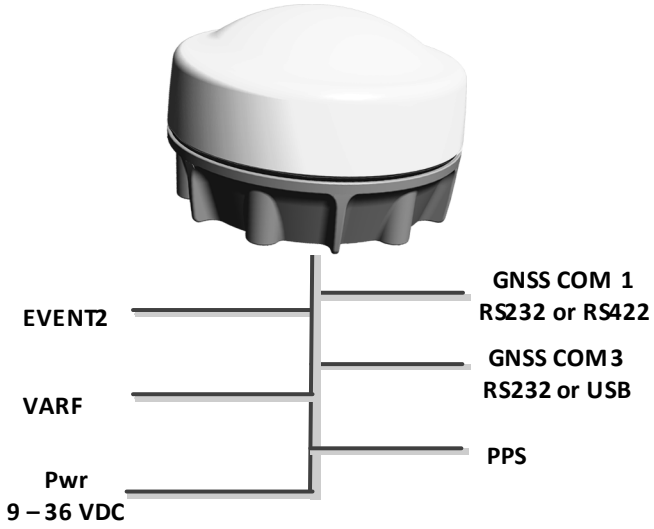

Figure 7 ReACT NSc Connectivity Overview

6.4.3 Mounting Points

The ReACT NSc comes with two mechanical mounting options.

3 x M6 screw points for vehicle mounting
3 x 10-32 UNF screw points for vehicle mounting

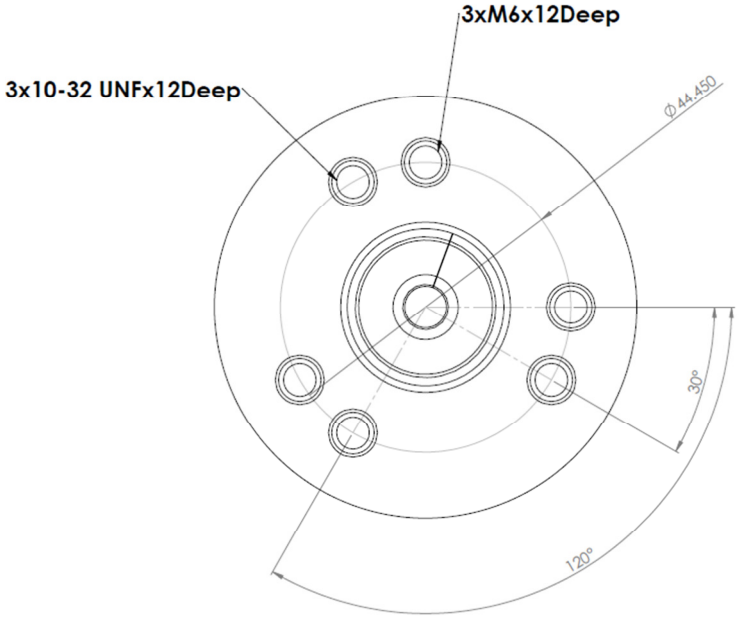

Figure 8 ReACT NSc mounting options

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6.4.4 Pinout

Description		
Flying leads		
Colour	**Signal**	**Description**
White	COM3 TXD / USB_D-	GNSS COM 3 or USB
Green	COM3 RXD / USB_D+	
Green / Red	NC	Reserved/ Not Connected
Red / Black	NC	
Yellow / Blue	NC	Reserved/ Not Connected
Yellow / Red	NC	
N/A	NC	Reserved/ Not Connected
N/A	NC	
NC	NC	Reserved/ Not Connected
NC	NC	
Orange	GNSS PPS	GNSS PPS strobe
Pink	GNSS EVENT2	GNSS Event In strobe
Turquoise	GNSS VARF	GNSS Variable frequency strobe
Blue	COM1 TXD / TX+	GNSS COM 1 (RS232 or RS422)
Violet	COM1 TX-	
Yellow	COM1 RXD / RX+	
Grey	COM1 RX-	
Black	Power Return	Power
Red	9-36V Power Input	
Shield.		Signal Ground

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7 ReACT D5: EDGE-WARE

7.1 Overview

EDGE-WARE is the name given to the firmware operating on the ReACT D5 model. EDGE-WARE consists of EDGE modules for providing additional functionality. Some modules are controlled through a license system. Please contact FSL support for any questions and for further detail on how to activate a license.

7.2 Modules

As standard EDGE-WARE consists of the following modules:

7.2.1 EDGE-PLX:

EDGE-PLX allows an additional three GNSS com ports and introduces the NovAtel firmware command interface. This module is designed to bring extra serial ports for additional peripheral devices and connectivity.

7.2.2 EDGE-COM

EDGE-COM brings a unique feature to the ReACT in the means of a configurable data message and output. Expert users can create their own data messages from the library of receiver data and output their custom messages at a range of output rates.

7.2.3 EDGE-CAN

EDGE-CAN brings functionality to the ReACT CAN port. Expert users can create their own CAN frames using the library of receiver data and the *CANConfig* PC utility.

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7.3 EDGE-PLX

7.3.1 Overview

EDGE-PLX has been designed to mimic the functionality of a direct GNSS com port. This allows for three additional serial ports to be used on the ReACT for obtaining NovAtel data logs.

7.3.2 NovAtel Firmware

For specific details of the data available and commands we advise having the NovAtel firmware manual available.

7.3.3 NovAtel Ports

NovAtel master ports (COM1 and COM3) can be used without restriction, however
NovAtel master COM2 is connected internally to the FS-D5 module as shown in the diagram below.

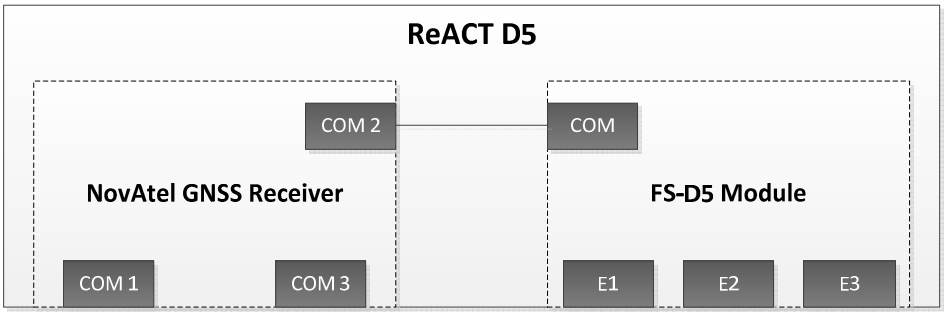

Figure 9 ReACT D5 GNSS to FS-D5 Connectivity

Users may issue commands that affect COM2, but should be aware of the special conditions relating to COM2 described below.

7.3.4 Special Note

It is recommended that “THISPORT” is used whenever applicable.

The FSL ReACT D5 model utilizes an internal connection to the GNSS COM2 port. Therefore any commands sent through GPS COM1 or GPS COM3 that will affect the configuration could reduce functionality.

When connected to either GPS com port the following commands should be avoided.

UNLOGALL
If UNLOGALL is sent to a GPS com port it will stop the output of commands on all GPS com ports and all of the EDGE com ports.

UNLOG
If UNLOG is sent to GPS com port it will stop the output of the specific command on all GPS com ports and all of the EDGE com ports.

COM COM2
GPS COM2 has been specifically configured for communicating with the FS-D5 and changing the baud rate of GPS COM2 will disable communications between the micro and the GPS receiver and therefore the micro com ports will no longer function.

INTERFACEMODE COM2
As with the COM command the INTERFACEMODE command on COM2 may cause a loss of comms.

FRESET/ RESET
These commands will reset the GPS receiver to its original state and will disable communications between the micro and the GPS receiver and therefore the micro com ports will no longer function. The ReACT D5 will recover after a power cycle

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7.3.5 EDGE Ports (E1, E2 and E3)

7.3.5.1 NovAtel Logs

Any standard NovAtel command, in any OEM4 or later series format, is supported. Operators should adhere to the special note regarding COM2 control.

The EDGE-WARE ports have been assigned as EDGE COM1 (E1), EDGE COM2 (E2) and EDGE-COM3 (E3). To log to a specific port the required EDGE COM port should be entered following the log command. For example:

LOG E1 GPGGA ONTIME 1 <- Output GPGGA on EDGE COM1 once per second.
LOG E2 GPGGA ONTIME 1 <- Output GPGGA on EDGE COM2 once per second.
LOG E3 GPGGA ONTIME 1 <- Output GPGGA on EDGE COM3 once per second.

Abbreviated-ASCII is provided as a human-readable interface for convenience while using a diagnostic HyperTerminal session (or similar). Near-simultaneous Abbreviated-ASCII commands on multiple ports are unlikely to elicit the expected response. The Abbreviated-ASCII protocol is not in general recommended for machine-based communications applications.

Abbreviated-ASCII logging control (LOG and UNLOG commands) will always have the desired effect, but may not always return the "<OK" acknowledgement.

7.3.5.2 FSLSAVECONFIG

This command saves the current EDGE-WARE specific commands to EDGE NVM, overwriting the last set of commands (similar to the NovAtel "SAVECONFIG" command).

7.3.5.3 FSLFRESET

This command clears the EDGE-WARE NVM (similar to the NovAtel FRESET command).

7.3.5.4 FSLLOG VERSION

This command will prompt a log that displays the version information of the EDGE-WARE firmware.

7.3.6 Bandwidth Monitoring

If the user requests too many logs at too high a rate, buffer overruns will occur.
The receiver will automatically indicate that this is occurring in the "Receiver Status" field of any NovAtel-format message. The firmware will not, however, attempt to monitor bandwidth.

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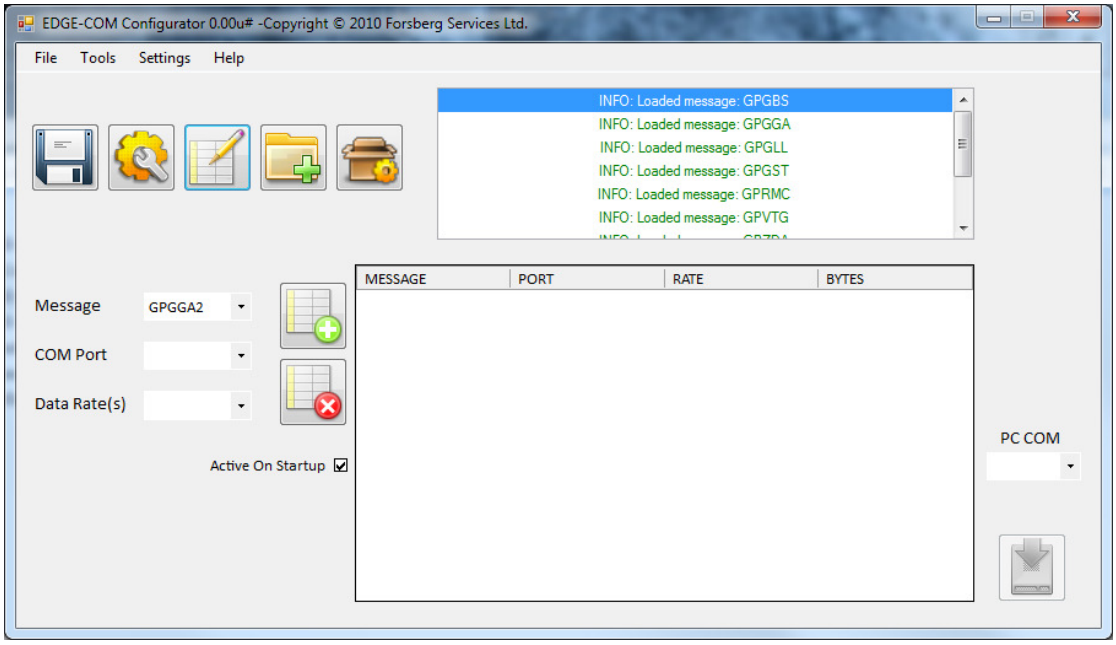
7.4 EDGE-COM

7.4.1 Overview

EDGE-COM has been introduced to allow users to create their own data messages from the NovAtel GNSS database. This allows for unique functionality to quickly adapt ReACT to interface to existing equipment and can be used to reduce data latency.

7.4.2 COMConfig PC Application

The COMConfig PC application provides the interface for controlling, creating, modifying and removing your bespoke data messages.



7.4.3 Create a New Log

A new log can be created by selecting the “Create a new log” icon

This will open the “Log Editor” window which displays the existing logs stored by COMConfig. Any of these logs can be used or modified.
To create a new log from a blank canvas select the “Create a new log” button.

This will open the “Log Creation Utility” window and allows for the data log to be created and modified.

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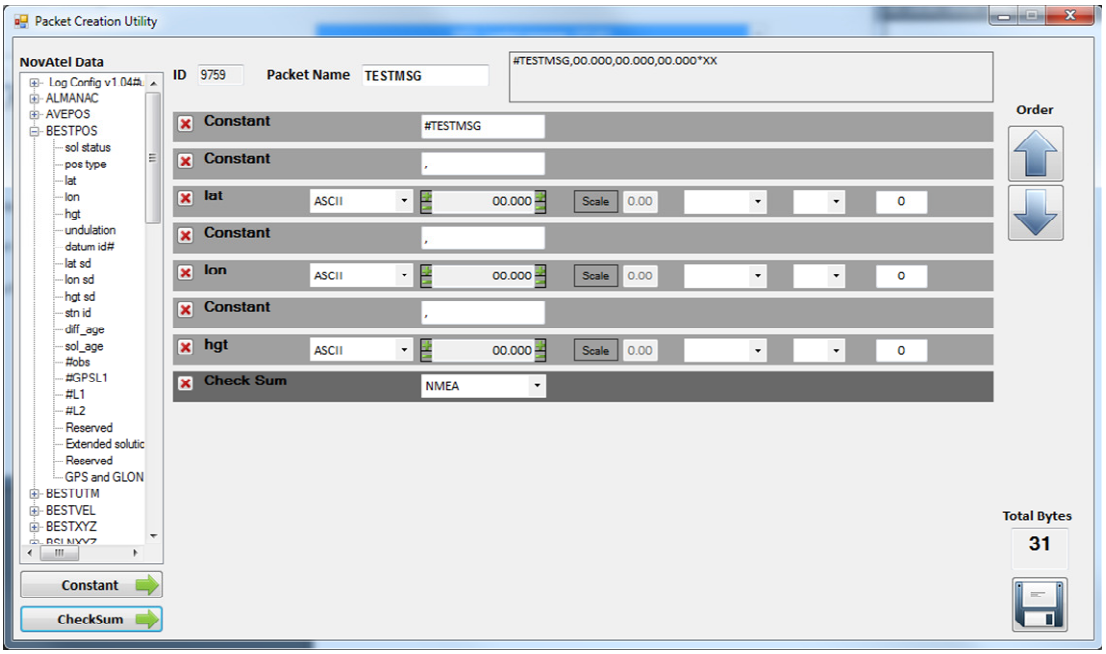


Figure 10 Log Creation Utility

7.4.3.1 NovAtel Data

The NovAtel data panel shows the full list of data logs available for selection from the NovAtel GNSS receiver. Data availability is subject to your GNSS receiver model, for example, the PVT model does not provide access to RANGE and other raw data. If in doubt please contact support@forsbergservices.co.uk for assistance.

To add a data field to the log double click on the required field and it will appear in the custom message.

To remove a data field click the remove button beside the data field.

7.4.3.2 Adding NovAtel Data

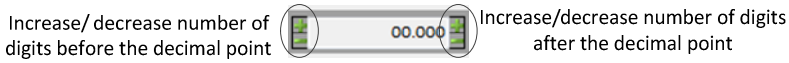
Once added, there are multiple options for configuring and tailoring the data field for use. The first step is to select whether the required data is in ASCII or binary format :

7.4.3.2.1 Type

The data field below shows the options presented for editing an ASCII or binary field.

7.4.3.2.1.1 Precision

The precision of the data can be adjusted using the increase and decrease controls on either side of the display box.


Increase/ decrease number of digits before the decimal point
00.000
Increase/decrease number of digits after the decimal point

7.4.3.2.1.2 Scale

The value in the data field can be scaled using this field. An example of its use is to represent the 1-sigma Latitude standard deviation to 2-sigma. Applying a scale of “2.00” would provide the correct value.

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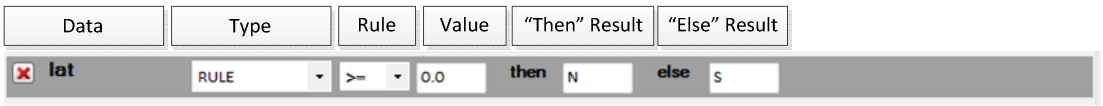
7.4.3.2.1.3 Format

The format selection has been added for amending the latitude and longitude fields specifically. The selection can be left as the default (decimal degrees) or set with decimal minutes or decimal seconds.

7.4.3.2.2 Applying a Rule to the Data

The data field can also be used to add data based on a rule set.



7.4.3.2.2.1 Rule

The following rules can be applied to the data, measured against the inserted value:

Data greater than the value	>
Data greater than or equal to the value	>=
Data equal to the value	=
Data less than or equal to the value	<=
Data less than the value	<

7.4.3.2.2.2 Then

This is the result that will show if the rule is matched.

7.4.3.2.2.3 Else

This is the result that will show if the rule is not matched.

7.4.3.3 Constant

The Constant field provides a text field to add your own constant parameter. For example, this can be a comma used to separate data logs, or a header field to identify the message.

7.4.3.4 Checksum

The Checksum button will add either an NMEA or NovAtel checksum to the data.

7.4.3.5 ID

Each message is automatically assigned a unique ID used by the application.

7.4.3.6 Assigning a Log Name

This is a unique name that will be used to identify the data log. This name is not built into the log, it is used to identify the message within the EDGE-COM application. To add the name to the log use the "Constant" input button.

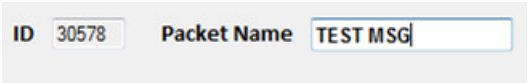


Figure 11 Assign a Log name

7.4.3.7 Preview Window

The preview window shows the current message and provides a preview of how the message will look.

Figure 12 Preview window

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7.4.3.8 Adjusting the Order

Each data field can be re-ordered using the up and down arrows.

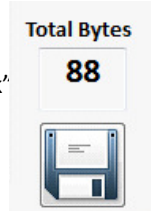
Figure 13 Order buttons

7.4.3.9 Total Bytes

The total size of the data log is shown towards the bottom right of the screen. This provides an indication of the message size and can be used for determining transmission and latency effects.

7.4.3.10 Saving

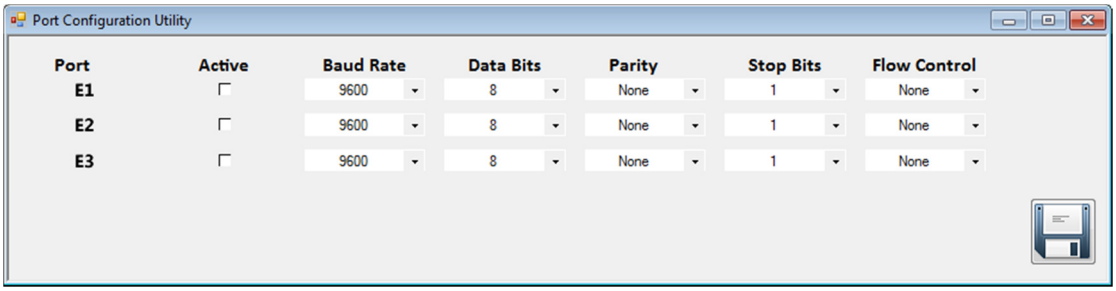
The custom log can be saved using the “disk”



7.4.4 Port Configuration

The EDGE-WARE com ports can be configured through the Port Configuration Utility page.
Select the Port Configuration button on the main screen

Use the drop-down boxes to select the serial parameters that are required and save to the device.



7.4.5 Selecting data output

Once the data logs have been created and the com ports have been configured, data output can be controlled using the main window.

Using the “Log” drop-down box select the data log required.
Select the com port which will output the data log.

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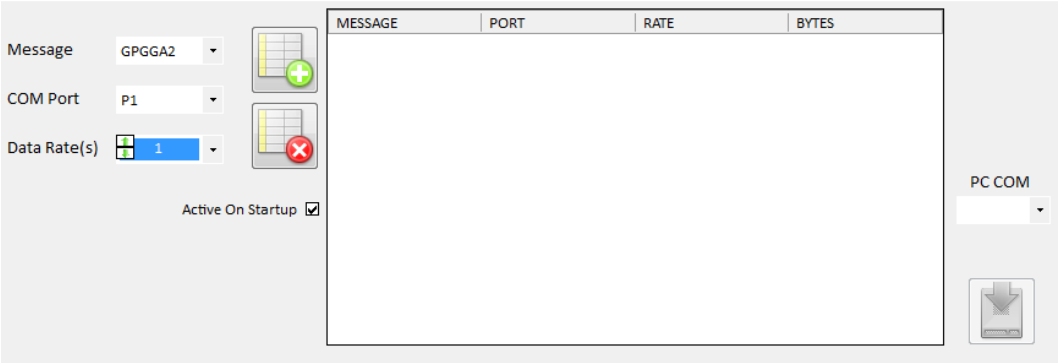
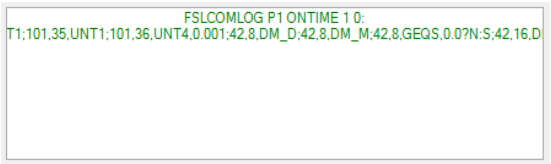
Finally select the rate at which the data log will be output .



Add the log to the list using the add button

Once the full configuration has been built it can be sent to the ReACT.
Select the PC com port to which the ReACT EDGE com port is connected to and press the send button.

The terminal window will display the status of the message:



The data shall start to output from the chosen com ports.

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7.5 EDGE-CAN

7.5.1 Overview

The EDGE-CAN module provides additional functionality for the ReACT D5 unit to output customised CAN frames with NovAtel GNSS data through selected CAN ports.

The ReACT D5 contains a GNSS receiver and provides a range of GNSS data through NovAtel messages. This data can be used to build specific CAN frames. The PC CANConfig Software provides a user interface for creating CAN frame configurations. It is used as a configuration utility for creating a list of CAN frames that will be transmitted to the EDGE-CAN firmware. This utility allows practically any field from a standard NovAtel GNSS message to be selected as data used in a CAN frame. The CAN ID's are represented by a numerical value and are selected before editing.

Once each CAN frame has been created the configuration settings are sent to any of the EDGE ("E") serial ports. The EDGE-CAN firmware will build and populate the CAN frames with the requested data and send the CAN frames through the CAN port at the selected rate.

7.5.2 CAN Protocol

The CAN protocol used on the EDGE-CAN system is the extended frame format with a fixed number of 8 bytes in the data field.

- There is no provision for flow control, device addressing and exchange of data of more than 8 bytes.
- These layers of the protocol are overlaid by using a standard such as CANOpen, which is not implemented in this system.
- The CAN bit rate is controlled using the CANConfig software.
- Frames are transmitted at a rate determined by the PC configuration software.

7.5.3 Extended CAN Frame Format

The extended CAN frame format is as follows:

Field name	Length (bits)	Purpose
Start-of-frame	1	Denotes the start of frame transmission
Identifier A	11	First part of the (unique) identifier for the data
Substitute remote request (SRR)	1	Must be recessive (1) optional
Identifier extension bit (IDE)	1	Must be recessive (1) optional
Identifier B	18	Second part of the (unique) identifier for the data
Remote transmission request (RTR)	1	Must be dominant (0)
Reserved bits (r0, r1)	2	Reserved bits (it must be set dominant (0), but accepted as either dominant or recessive)
Data length code (DLC)	4	Number of bytes of data (0-8 bytes)
Data field	**0-8 bytes**	**Data to be transmitted (length dictated by DLC field). Data is selected using the CANConfig PC application.**
CRC	15	Cyclic redundancy check
CRC delimiter	1	Must be recessive (1)
ACK slot	1	Transmitter sends recessive (1) and any receiver can assert a dominant (0)
ACK delimiter	1	Must be recessive (1)
End-of-frame (EOF)	7	Must be recessive (1)

The two identifier fields (A & B) combined form a 29-bit identifier.

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7.5.4 CAN Data Field Configuration and Content

The EDGE-CAN firmware provides the facility to configure the data field. CAN frames can be configured to contain NovAtel GNSS Logs. In this context, a CAN frame is the low-level frame consisting of a header, numerical ID, and 8 bytes of NovAtel data. The user specifies the frequency at which each the CAN frames will be output.

7.5.5 CANConfig PC application

The CANConfig PC application provides the functionality to create the custom CAN frame data. CANConfig runs on a Windows PC and sends the configuration to the ReACT through one of the EDGE ("E") com ports.

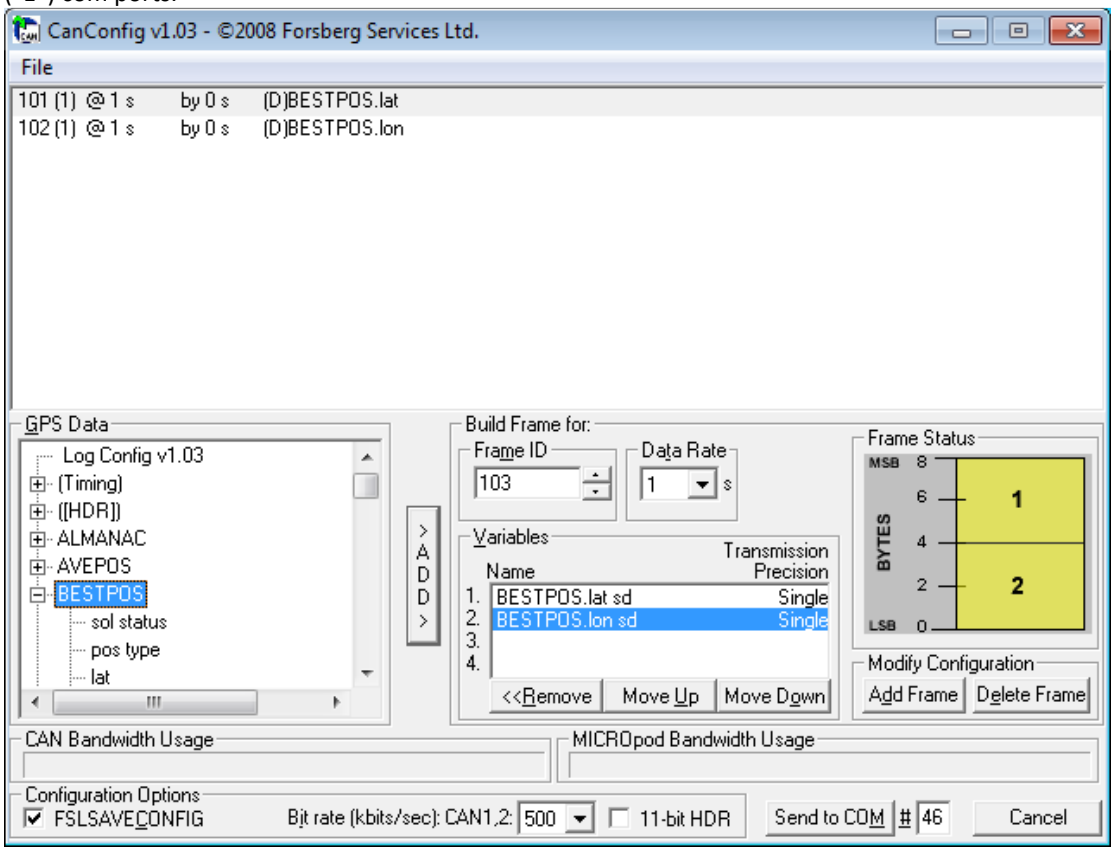

Figure 14 CANConfig User Interface

7.5.5.1 Connecting to the ReACT

The CANConfig PC software requires a serial connection to one of the ReACT EDGE ports to apply the CAN port configuration.
(Note: Currently EDGE-WARE does not support CAN commands direct to the CAN port.)

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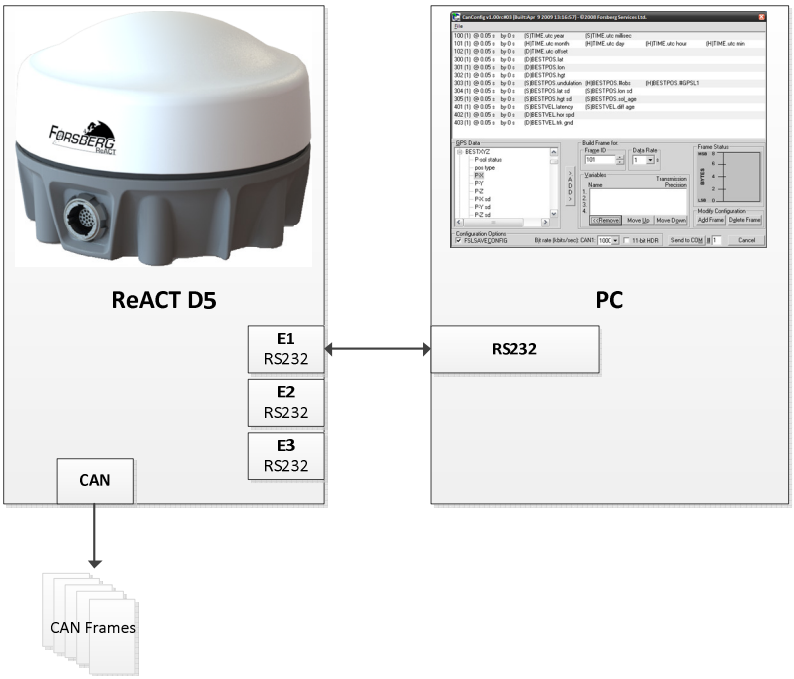

Figure 15 ReACT - PC CANConfig connection

7.5.5.2 Selecting a Frame ID

Each CAN frame is identified by a numerical value. When setting a CAN frame, select the ID of the CAN frame using either the arrow buttons or by manually entering the value. Once the CAN frame has been selected the frame build display will show the information relating to the CAN frame. If the CAN frame is empty then no data will be displayed and if it is populated the variable data will be displayed.

7.5.5.3 Data Rate

The data rate is the frequency at which each CAN frame is output of the CAN port. This can be set using the data rate field.

Selection	Meaning
Numerical Value: Select using drop down box	This will define how many times the data is output per second. A value of 1 signifies that the frame will be passed every second and a value of 5 will indicate the frame will be passed every 5 seconds.

7.5.5.4 Selecting Variables

The data available to build a CAN frame is contained within the 'GPS Data' field. The 'GPS Data' field works in a 'tree' like structure. The display shows the list of logs that are available through the NovAtel receivers. Within their associating logs the variables are contained.

To Add a Variable to the CAN Frame

1. Use the NovAtel "OEMV Family Firmware Reference Manual" to locate the required data. Note the log that the data is stored under.
2. Click the required log in 'GPS data' field to expand variables contained within the log.
3. Select the required variable and click 'ADD'
4. The variable will be added to the selected CAN frame

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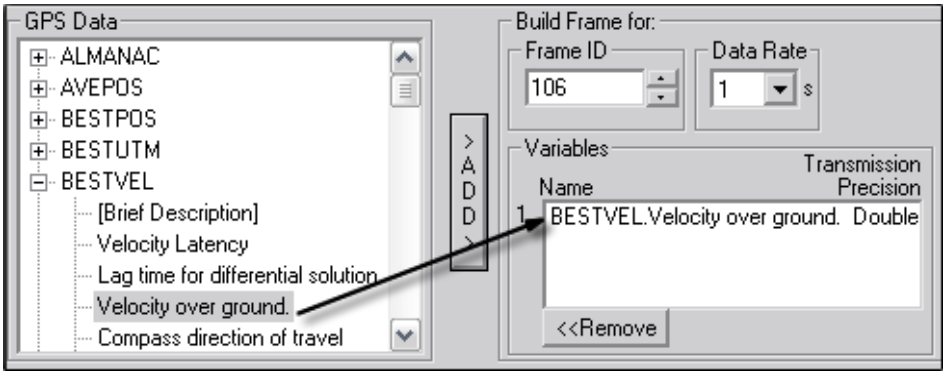

Figure 16 Adding variables

When the variable is added to the CAN frame it will be displayed at the top of the 'Variables' field. This displays the variables contained in the CAN frame data field.

7.5.5.5 Altering Frames

Once a CAN frame has been populated with the required variables their position within the frame can be altered. By changing the position of the variable within the frame the precision of the variable will be adjusted. By a rule, if a frame has 3 variables in its data field the first variable will have the highest precision.

Adjusting Variable Positions

To move a variable position within a frame

1. Select data by clicking on the variable name
2. Use the 'Move Up'/ 'Move Down' buttons to shift the variable's position

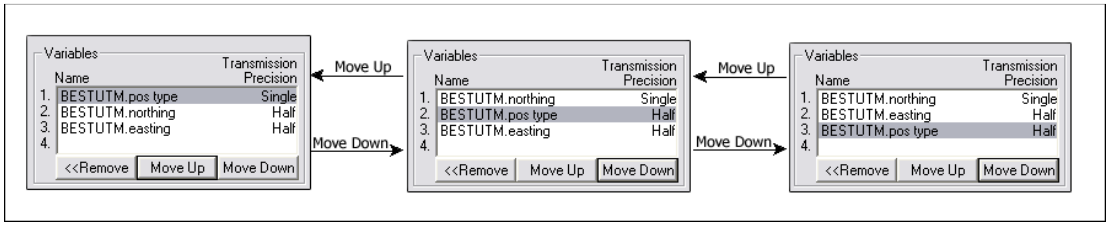

Figure 17 Variable positioning

***NOTE:** When 3 variables are contained within the data field moving a variable may affect the precision. In a 3 variable set the first variable will have single precision and the next two will have half precision.

7.5.5.6 Removing a Variable

If a variable is required to be removed from a frame

1. Click on the desired variable name
2. Click 'Remove'
3. The variable will no longer be in the data field

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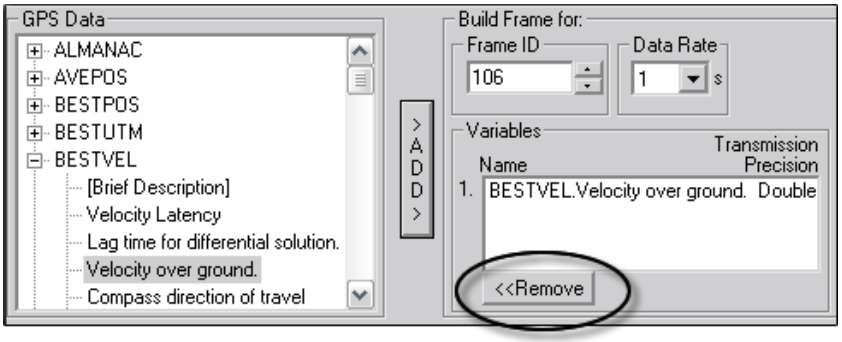

Figure 18 Removing a variable

7.5.5.7 Frame Display

Once a frame has been committed the information for that frame will be shown in the display area. The display shows:

Frame ID	Data rate	Offset	Variable precision (in brackets)	Variable

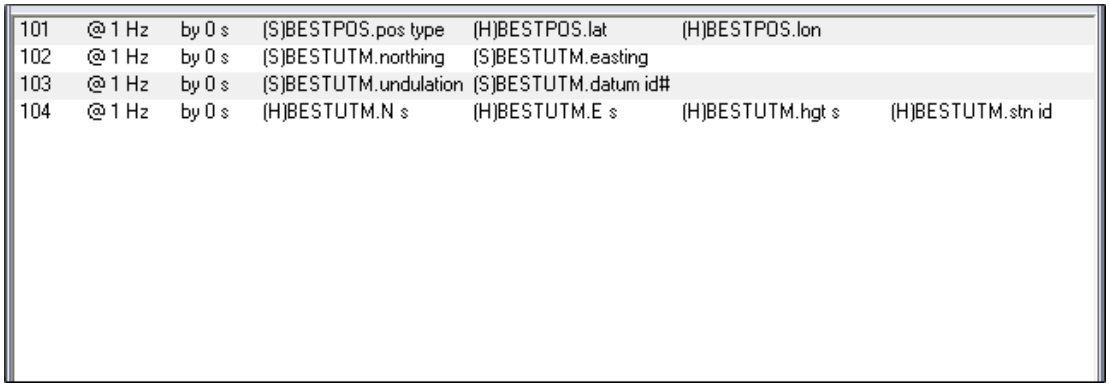
101 @ 1 Hz by 0 s (S)BESTPOS.pos type (H)BESTPOS.lat (H)BESTPOS.lon
102 @ 1 Hz by 0 s (S)BESTUTM.northing (S)BESTUTM.easting
103 @ 1 Hz by 0 s (S)BESTUTM.undulation (S)BESTUTM.datum id#
104 @ 1 Hz by 0 s (H)BESTUTM.N s (H)BESTUTM.E s (H)BESTUTM.hgt s (H)BESTUTM.stn id

Figure 19 CAN Frame display

The display is used to show details of each CAN frame and also as a means of quickly accessing and editing a desired frame. A frame can be selected to edit from this display by double clicking on the frame line.

7.5.5.8 Adding the Frame

Once a CAN frame has been created it can be added to the configuration, Click the button 'add frame' at the bottom of the application. The CAN frame will then appear in the display area.

7.5.5.9 Bandwidth Usage

The CAN and processor bandwidth usage bars provides an indication to whether the selected data can be output at the required rate.

7.5.5.10 Saving the Configuration

Checking the SAVECONFIG check box will ensure that the configuration is saved through a power cycle until the configuration is overwritten by saving another configuration.

7.5.5.11 Selecting the CAN Baud Rate

The baud rate for the CAN port can be selected using the drop down box.

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7.5.5.12 Committing the Configuration

Once the configuration has been fully compiled it can be sent to the ReACT. Go to the “Send to Com button” and enter the PC com port that the ReACT is connected to. Press the button and the configuration command will be issued to the ReACT.

7.5.5.13 Closing the Application

To exit the application select the ‘x’ in the top right hand corner of the application.

7.5.5.14 Cancel

To cancel all work on the configuration and quit the application without saving select “Cancel”.

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